

CONTRACT DATA REQUIREMENTS LIST

(2 Data Items)

n Approved
OMB No. 0704-0188

The public reporting burden for this collection of information is estimated to average 220 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please DO NOT RETURN your form to the above address. Send completed form to the Government Issuing Contracting Officer for the Contract/PR No. listed in Block E.

A. CONTRACT LINE ITEM NO. B. EXHIBIT C. CATEGORY:
TDP _____ TM _____ OTHER _____

D. SYSTEM/ITEM E. CONTRACT/PR NO. F. CONTRACTOR
C-5/Nose Radome

1. DATA ITEM NO. 2. TITLE OF DATA ITEM 3. SUBTITLE
A001
A002 First Article Qualification Test Plan Radome, Nose, Assembly of,
P/N/4D60032-101B
NSN 1560-01-149-2746UC

4. AUTHORITY (Data Acquisition Document No.) 5. CONTRACT REFERENCE 6. REQUIRING OFFICE
DI-NDTI-81307 AFMC Form 260 Blk 9C,12 WR-ALC/LTES

7. DD 250 REQ 9. DIST STATEMENT REQUIRED 10. FREQUENCY 12. DATE OF FIRST SUBMISSION 14. DISTRIBUTION
DD ONE/R 30 DAC Award
8. APP CODE 11. AS OF DATE 13. DATE OF SUBSEQUENT SUBMISSION
A D N/A N/A
a. ADDRESSEE b. COPIES
Draft Final
Reg Repro

16. REMARKS
Blk 4: Test Plan will be in accordance with MIL-HDBK-831 and will cover pre-production/first article testing.
NOTE: Contractor will incorporate requirements of AFMC Form 260 into this test plan.
Blk 14: Reproducible copy of Test Plan shall be as a searchable Adobe Acrobat PDF file on CD-ROM.
WR-ALC/LTES
216 Ocmulgee Ct.
Robins AFB, GA
31098-1645
Paper Copy 1 1
Digital Copy 1
15. TOTAL 1 1 1

1. DATA ITEM NO. 2. TITLE OF DATA ITEM 3. SUBTITLE
A002
A003 First Article Qualification Test Report Radome, Nose, Assembly of,
P/N/4D60032-101B
NSN 1560-01-149-2746UC

4. AUTHORITY (Data Acquisition Document No.) 5. CONTRACT REFERENCE 6. REQUIRING OFFICE
DI-NDTI-80809B WR-ALC/LTES

7. DD 250 REQ 9. DIST STATEMENT REQUIRED 10. FREQUENCY 12. DATE OF FIRST SUBMISSION 14. DISTRIBUTION
SD ONE/R 180 DAC Award
8. APP CODE 11. AS OF DATE 13. DATE OF SUBSEQUENT SUBMISSION
N/A D N/A N/A
a. ADDRESSEE b. COPIES
Draft Final
Reg Repro

16. REMARKS
Blk 4: Test Report will be in accordance with MIL-HDBK-831 and will cover pre-production/first article testing.
NOTE: Contractor will incorporate requirements of AFMC Form 260 into this test report.
Blk 14: Reproducible copy of Test Report shall be as a searchable Adobe Acrobat PDF file on CD-ROM.
WR-ALC/LTES
216 Ocmulgee Ct
Robins AFB, GA
31098-1654
Paper Copy 1 1
Digital Copy 1
15. TOTAL 1 1 1

G. PREPARED BY H. DATE I. APPROVED BY J. DATE
20030730 30Jul03

17. PRICE GROUP

18. ESTIMATED TOTAL PRICE

17. PRICE GROUP

18. ESTIMATED TOTAL PRICE

OMB Approved
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The public reporting burden for this collection of information is estimated to average 110 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0701-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that if it does not display a currently valid OMB control number. Please DO NOT RETURN your form to the above address. Send completed form to the Government Issuing Contracting Officer for the Contract/PR No. listed in Block E.

D. SYSTEM/ITEM C-5 Aircraft/Radome, Nose	E. CONTRACT/PR NO. FD260-03-35329	F. CONTRACTOR
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17. PRICE GROUP

**18. ESTIMATED
TOTAL PRICE**

16. REMARKS	WR-ALC/LGECB	1		1
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Block 4:


AIR FORCE (CAGE CODE 98752) DRAWING 9579776 LATEST REVISION
IS A PART OF THIS CDRL. A PART OF THE DRAWINGS MAY BE
REQUESTED THROUGH THE PROCUREMENT CONTRACTING OFFICER.

[SEE ATTACHED SHEETS]

Block 10, 11, 12 and 13:

Draft drawings shall be submitted to WR-ALC/LGECB for format and WR-ALC/LTES for technical content no later than 180 days after contract start. Government review comments will be provided no later than 30 days after submittal. Final drawings due 30 days after receipt of Government comments.

[illegible]

G. PREPARED BY  Francis X. McRory <small>Digitally signed by Francis X. McRory DN: cn=Francis X. McRory, email=McRory.FX@FBIHQ, o=FBI Date: 2003.11.10 09:58:28 +0800</small>	H. DATE 14 Nov 03	I. APPROVED BY	J. DATE
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CONTRACT DATA REQUIREMENTS LIST
(1 Data Item)

A. CONTRACT LINE ITEM NO.	B. EXHIBIT A	C. CATEGORY: TDP _____ TM _____ OTHER <u>X</u>	
D. SYSTEM/ITEM C-5 Aircraft/Radome, Nose	E. CONTRACT/PR NO. FD260-03-35329	F. CONTRACTOR	

16. REMARKS (Continued)

APPLICATION			REVISIONS																		
NEXT ASSY	USED ON		LTR	DESCRIPTION						DATE		APPROVED									
			F	REVISED PER ECO 96A0006						2 May 2003		B.Y.									
REV SHEET																					
REV SHEET	F	F	F	F	F																
REV SHEET	19	20	21	22	23																
REV STATUS OF SHEETS			REV SHEET	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Distribution Statement A. Approved for public release; distribution is unlimited.																					
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES ± .XX ± ± .XXX ±			SIGNATURES ARE ON FILE ON AF FORM 2602 IN LGEC			U.S. AIR FORCE ROBINS AFB, GA															
			APPROVALS DATE																		
			DRAFTSMAN			TITLE Digital Data Description Requirement															
			Robert Yohe 12/08/95																		
CHECKER																					
Edwin Bray 12/08/95																					
MATERIAL ENGINEER			Edwin J. Reid 12/11/95																		
PROJECT ENGINEER																					
TREATMENT			PROJECT AUTHORITY			SIZE	A.F. CODE IDENT NO.				DRAWING NO.										
None			Donald Looney 12/11/95			A	98752				9579776										
FINISH			RELEASE AUTHORITY			SCALE		REV F				SHEET									
None			David Olson 12/11/95			None						1 OF 23									
ENGINEERING DRAWING LAYOUT A VERTICAL																					

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1. Scope: The intent of this document is to define the content, format, and media requirements for delivery of Digital Engineering Data to the U.S. Air Force for electronic storage into Warner Robins Air Logistics Center digital data repositories.

2. Quantities, Distribution, and Software Identification:

- a. For quantities and distribution, refer to block 14 of the DD Form 1423 that calls out this requirement.
- b. As the contractor determines that a particular software tool will be used to produce Product Definition Data (see paragraph 6), a letter shall be sent to the requiring office identified in block 6 of the DD Form 1423. The letter shall identify the software name, software version, hardware platform, and vendor of the software. The prime contractor shall obtain the same letter from all of their applicable subcontractors/vendors on this contract. This information will enable the U.S. Air Force to plan and budget for software tools.

3. Digital Data Delivery (Sample): The contractor shall submit four (4) representative samples of each digital data format to be submitted for verification of procedures and processing into a government data repository into the development process at intervals called out in the DD Form 1423. The representative samples shall include data in the appropriate digital formats (native, neutral, HPGL, legacy data, Gerber data, design models, metadata spreadsheet, IDL, IPL, etc. where applicable). The representative samples shall identify the computer system (including operating system with its version), computer software application used to archive the data and version used, respectively, of the system originating the data on the media label. The contractor shall also submit a digital sample of the Metadata Spreadsheet representative of the sample files delivered in the format described in paragraph 7 of this document. See Table 1 for acceptable media.

- a. A copy of the IGES/DXF processing/error log file created during the generation of the sample IGES/DXF files shall also be submitted in digital form. This file shall not be reflected in entries in the Metadata Spreadsheet for the sample.

- b. Sample files shall be accompanied by a technical point of contact (POC) (name, phone number, FAX number, and e-mail address if available) stated in an ASCII text file, preferably on a 3.5" floppy for sample data only. This will enable any problem, which may be evident in the sample delivery to be resolved in a timely manner prior to final digital data delivery.

- c. Sample files shall have one sheet per filename (drawing deliverables only), unless the sample data represents word processing or PDF document files.

4. Digital Data Delivery (Interim and Final): Digital data shall be delivered, as updates require for interim delivery and as a final delivery of all updated data, in accordance with the continuation sheet to the DD Form 1423 which calls out this requirement and as follows:

- a. On digital drawing formats the sheet layout, border, title block, revision block, other contractually imposed format conditions, and other conventions of engineering drawing format including definition and use of explicit scaling factors shall be integral to the digital data file. Filenames for all digital data shall include the appropriate file extensions where practical or appropriate and shall be included in the metadata spreadsheet filename column. Engineering drawings shall be drawn using a CAD system, except for legacy data according to paragraph 5, and shall conform to the DD Form 1423.

- b. All pertinent entities that comprise the final digital file should be viewable upon opening of the digital data files. If they cannot be viewable without the user being required to change layers or levels, then file layer or level conventions shall be identified for all data residing in the digital data file or may be identified in the contractor's drawing or modeling standards. These standards shall become deliverable items whenever government CAGE coded data are on contract. This prevents the user from having to search for layers, which should be turned on or off in order to view the final drawing's entities.

c. File layer or level conventions as stated in paragraph 4b, which are used, shall be identified for all data residing in the digital data file.

d. Metric dimensioning is applicable only when interfacing with existing items that were dimensioned in metric. When metric dimensioning is required, the drawings shall define the interface in metric accompanied by a parenthetical equivalent decimal inch dimension.

e. Revisions made to the digital database shall accurately and precisely represent the change in dimensions to the geometry of the object or assembly to ensure the shareability of the represented data.

f. Do not import or paste raster images, such as TIF, GIF, JPG, and Bitmap into a CAD generated vector drawing format.

g. Files shall be delivered in separate subdirectories by product definition data type (such as native, neutral, drawings, documents, etc.) to simplify processing.

h. Delivery Media Requirements: Media requirements (physical and file copy format) of the following types are listed in order of preference for delivery of digital data. In order to take advantage of the latest in digital media technology, other media not listed shall be approved by the requiring office identified in block 6 of the DD Form 1423 which calls out this requirement. See Table 1 for acceptable media and other pertinent information:

TABLE 1
ACCEPTABLE MEDIA FOR AIR FORCE DELIVERABLES (Sample & Final)

Type	OS** or earlier version	Acceptable Format	Max Length	Max Size	Density	Requirements***
CD-R*		ISO 9660/Joliet	63 minute	553 Megabyte		Uncompressed
CD-R*		ISO 9660/Joliet	74 minute	650 Megabyte		Uncompressed
CD-R*		ISO 9660/Joliet	80 minute	700 Megabyte		Uncompressed
3.5" Floppy Disk	DOS 6.2	DOS		1.44 Megabyte	High Density (HD)	Uncompressed
Internet connection****		ftp or Web-based				

* Three formats are available for the production of CD-Rs. Paper labels shall not be used on CD-Rs. CD-RW and DVD are not acceptable delivery formats.

** Operating System (OS) requirement

*** Files delivered must be uncompressed (unless also delivered with decompression software used in the compression)

**** Allowed only with prior approval of the Engineering Data Management Specialist (EDMS)

NOTES:

"ISO 9660" is the preferred option to read the CD on different platforms, including DOS, Macintosh, OS/2, Windows, and UNIX. Files and directories recorded to CD based on the ISO 9660 standard must meet the following (8+3) requirements: A file name may not contain more than eight alphanumeric characters and the underscore symbol "_". A file name extension may not contain more than three alphanumeric characters. A directory name may not contain more than eight alphanumeric characters and the underscore symbol "_". The CDs shall be recorded using mode one, level one, and single session media.

"Joliet" is an alternate acceptable format option. Joliet formatting allows for filename length greater than the (8+3) format. The maximum filename length allowed by this document is 30, including periods or other special characters. Joliet also records the associated MSDOS-standard name (8+3 characters) for each file so that the CD may be read on MSDOS systems, Windows, or earlier versions of Windows. The CDs shall be recorded using mode one, single session media.

i. Physical media shall be labeled with the following information:

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- (1) Prime Contractor Name/CAGE
- (2) Contract number
- (3) System
- (4) The physical media shall be numbered sequentially (e.g., "Disk 2 of 3"), regardless of the type of media.
- (5) Range of document numbers included on the disk label, if more than one disk is used.
- (6) For CD's, list the archiving method used to create the CD (ISO 9660/Joliet).
- (7) The appropriate Distribution Statement and Export Control Notice shall be listed in accordance with the DD Form 1423, which calls out this requirement.

j. README.TXT File: On one of the delivered disks, formatted via MS-DOS or Windows, the contractor shall supply a README.TXT file in ASCII text format. This file shall include:

(1) The name, version, and applicable raster data format or raster compression type of the file or software utilized in the creation of the native, neutral, legacy, and document files included in the delivery.

(2) The type and number of files included in the delivery. For example, a statement similar to the following might be used:

Total Number of Files Delivered:	1200
Number of Native Files:	400
Number of DXF Files:	400
Number of HPGL Files:	400

(The DXF files delivered are representative neutral files of the native files. The HPGL files are representative view-only files of the native files.)

(3) The name, phone number, and e-mail address of the contractor's technical data point of contact (a person familiar with processes used to create and archive data).

(4) The operating system and version, and the command (e.g., UNIX tar) and command switches used to archive the delivered data.

(5) Explanation, as necessary, of field headings/data titles used in the metadata spreadsheet.

(6) Any other information pertinent to the data delivery and the usage of the software packages, including the document, drawing, design, and associated files shall be stated. This includes special instructions for the proper setup of the CAD software package to import the native files.

(7) If special fonts are used for delivered CAD drawings, the contractor must notify the U.S. Air Force at time of delivery.

5. Legacy Data:

a. Raster drawings and any type of document developed in a non-electronic or non-CAD format (e.g., manual drafting board, desktop publishing, word processing, or scanned formats) and have not been previously delivered to the government, shall be considered as "legacy data" and be delivered in digital form in a standardized format, such as JEDMICS C4 per MIL-PRF-28002, Continuous Acquisition and Lifecycle Support (CALS) TYPE 1, CCITT Group 4 (using MIL-STD-1840B or later format) or Tagged Image File Format (TIFF) Group 4. The minimum

resolution for raster images shall be 200 dots per inch (dpi). All H-, J-, and K-sized raster images shall be "portrait" orientation to facilitate proper printing from JEDMICS printers.

When legacy files in MIL-STD-1840B format or later are provided, the header information, whenever available, shall include additional fields for each individual header file, which may not normally be covered by the military or other standard these files are delivered under. These additional fields per drawing or document number are DATE (release date), DOCUMENT TITLE, and TOTAL NUMBER OF SHEETS. These files shall be delivered separately from other required digital data formats.

NOTE: Some raster image viewers do not always recognize the correct polarity of a black and white TIFF or other raster image types. Because of this fact, in order for the government to receive the correct polarity files, some sample legacy files should be saved (by the contractor) both negative and positive polarity before delivery to the government in order to compare file sizes and proper polarity in viewing software. In most cases, the smaller file size for each test digital file saved indicates a white background with black data information, which is the correct positive polarity needed by the government. It is understood that many artwork legacy files will have larger file sizes, whenever the contractor provides the correct polarity, since the foreground information will be black.

b. Electrical/Electronic Product Related Drawings produced on stable based drawing media (such as undimensioned, master pattern, etc) shall be digitized into a Gerber file format (RS-274 or Extended Gerber RS-274X) for manufacturing purposes. The RS-274X format, if used, shall be in compliance with the current version of the 'Gerber RS-274X Format User's Guide' (Part # 414-100-014 Rev B or later revision) by Gerber Systems Corp and shall not contain data that will restrict its usage as a neutral file format for laser photoplotters.

(1) The resulting files shall be quality checked for compliance with the design requirements specified in the technical data package, which includes the stable based drawings. This will ensure that the integrity of the design is maintained after the digitizing process.

(2) The Gerber images shall contain the following note (at a location where it will not interfere with the artwork layer images):

"THIS GERBER IMAGE WAS PRODUCED BY DIGITIZING AN IMAGE FROM A STABLE BASED MATERIAL."

c. Undimensioned Mylar drawings for mechanical related items (flat patterns, loft, etc.) and applicable electrical items (non-artwork types such as electrical cables) shall be prepared, precisely processed, and scanned with the appropriate process to maintain the dimensional accuracy required by the drawings. A government inspection of this process is required.

After scanning, tests shall be done by overlaying prints of the scanned image over the original Mylar checking for exact overlay and matches of grid lines, curves, other drawing details, and possible distortion and deviation. As an acceptance criterion, an exact overlay and match to the original without distortion and deviation is required. The digitized drawings shall be delivered as TIFF (CCITT) Group 3 or 4 files.

6. Product Definition Data: Product Definition Data is grouped in four basic categories. Definitions and delivery formats are as follows:

Note: To enhance manageability, transportability, and usability, applicable native and neutral design model files shall be efficiently grouped and encapsulated at each appropriate item level. The encapsulated model files shall include design data such as schematics, printed circuit board assemblies, mechanical item models, 3-D models, parts libraries, link files, configuration files, attribute files, and other associated files required to regenerate the complete design in any CAD environment that has the native or other suitable design software package. Also, the above requirement applies to machine control data (such as Gerber, drilling, etc) and software data files. Either MS-Windows based PKZIP (version 2.5 or subsequent to handle long filenames) or UNIX's "TAR" command is the preferred encapsulation methods. If these preferred methods are not used, an alternate method must be approved by

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an EDMS at LGEC/WR-ALC before data delivery. Single files that exceed the capacity of a CD shall use a file splitter program that creates a *.BAT file that can be used to reconstruct the parts of the split files after delivery.

a. *Word Processor and Supporting Logistics Documents*: Documents created on a word processor can be delivered and interpreted on the majority of word processing systems including those widely used in the DOD, such as Microsoft Word® (preferable) and WordPerfect®. Software packages other than these require prior approval by an EDMS at LGEC/WR-ALC. Test Methods and Procedures, Associated Lists, Acceptance Testing Criteria, Configuration Item Specs, and Engineering Analysis results are examples of these documents. Imported objects, such as illustrations and graphics, shall not be delivered inside of a word processing, desktop publishing, or spreadsheet formatted document unless a single copy of the program(s) used to produce the embedded objects is (are) provided to the government as a part of the cost of providing a particular digital data package. The neutral document files shall allow viewing of complete documents without the need for any specific native or source software program. Documents delivered shall be the standard 8-1/2 by 11 inch or equivalent "A" or "B" [11" by 17"] drawing size. Word processing documents shall have one filename on the data media to cover all sheets for each document number submitted.

A PDF document delivered as a single file shall have the spreadsheet fields populated by having the sheet number as "1" and total number of sheets equal to the total number of sheets in the single PDF file. A PDF document delivered that is split into two or more separate files shall have the starting sheet number of the file as the sheet number field and have the total number of sheets as the total number of sheets field that make up all of the combined PDF files. All sheets within the PDF file shall be in numerical order when the document is viewed. The preference is to have the PDF documents delivered with full text-searchable capability, rather than scanned images, Image plus text, or image-only documents. If Optical Character Recognition (OCR) must be used to make a PDF document text-searchable, then these files are not acceptable for PDF document deliveries.

NOTE: Government CAGE coded documents shall be delivered in Microsoft Word®.

Delivery Format: Native Document - MS-Word® or WordPerfect®

AND

Neutral Format - Acceptable RTF or ASCII text or Portable Document Format (PDF)

b. *Engineering Drawings (VECTOR)*: Drawings shall be delivered that are made from presentations describing a particular physical/logical entity or process using 2-dimensional geometry and textual information for both electrical/electronic and mechanical items. These drawings may also be created from view plane projections of a 3-D model, but parametric-based systems exist that will facilitate semi-automatic creation of engineering drawings from the 3-D database. Drawings shall be delivered in all formats below where the scale of the drawing form is 1-to-1. In other words, a D-size drawing shall measure 22 inches high by 34 inches wide, no matter what scale factor is called out (if any) in the title block of that drawing, per ANSI Y 14.1. The requirements set forth in paragraph 6(c), Mechanical Engineering Models of the Geometry Creation Requirements for 3-D Models shall apply. A map of delivered loft surfaces shall also be provided in the aircraft coordinate system to correlate with delivered drawings, when loft data drawings are delivered.

NOTE: Government CAGE code drawings shall be delivered according to Air Force document "9626025" CAGE 98752. They shall not have drawings delivered containing a mix of vector and raster images. They shall also not contain any grouped text attributes and all entities shall be present on layer zero.

Delivery Format: Native CAD - Any format native to the contractor's CAD system is acceptable, e.g. AutoCAD® (preferred), Catia®, Intergraph®, Cadkey®, Applicon®, Computervision®, SDRC Ideas®, or Mentor Graphics® and others.

AND

Neutral - Drawing eXchange Format (DXF)(preferred), American National Standards Institute (ANSI) Initial Graphics Exchange Specification (IGES) Version 5.0 or higher, or Product Data Exchange using STEP (PDES)/STandard for the Exchange of Product data per ISO 10303 Application Protocols (AP) 201

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through 206 and 210.

AND

View only - Hewlett Packard Graphics Language® (HPGL) shall be delivered per HPGL Creation Requirements below. However, if HPGL cannot be produced from the CAD system, the following may be substituted upon obtaining approval and format from an EDMS at LGEC/WR-ALC: Continuous Acquisition & Lifecycle Support (CALS) Type I, CCITT Group 4 (MIL-PRF-28002) or TIFF Group 3 or 4. PDF files shall not be allowed as a substitute view-only format for drawing deliveries, unless prior approval is given by the EDMS at LGEC/WR-ALC. H-, J-, and K-sized PDF drawings in PDF format shall not be delivered.

View Only HPGL Creation Requirements:

- (1) Use HPGL or HPGL/2
- (2) HPGL files shall be generated from the native drawing CAD program.
- (3) Choose HP 7586 or other compatible plotter.
- (4) For Autocad and Autocad-compatible formats, to specify the part of the drawing to plot, use <L> limits setting, assuming the limits setting is the same as the drawing (model space) sizes A through E, or using the <W> window option for J-sizes.
- (5) Plot is NOT rotated.
- (6) Area fill will NOT be adjusted for pen width.
- (7) Hidden lines will NOT be removed.
- (8) Scale the contents of the drawing according to the scale factor as stated in the title block. Place these contents on the drawing form so that the drawing form is preserved at a scale of 1-to-1. For example, a D-size drawing shall measure 22 inches high by 34 inches wide, no matter what scale factor is called out in the title block. Note: The ComputerAided Design (CAD) definition is the apparent size of objects in a view with respect to a drawing sheet/form.
- (9) Plot origin is at 0.00,0.00.
- (10) Plot optimization level = 4
- (11) Output files shall have a .PLT extension
- (12) Multiple drawing sheets or plotter files under the same filename are not acceptable for delivery.
- (13) The Hide Lines command shall be used for producing AutoCAD plotter files involving the use of 3-D entities used in the creation of 2-D drawings.
- (14) Create plot files from other CAD systems using the same settings as the native files (e.g., not from converted IGES or DXF files). The drawings should be full-scale plots to a file using the CAD system's default file extensions for producing HPGL files. Drawings created on a CAD system larger or smaller than a ratio of 1:1 when compared to standard drawing sizes (such as C size at 17" x 22"), shall be scaled to the standard drawing sizes (when measured across its length and width) whenever plot files are to be produced for delivery to the government.

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c. *CAD Models, Tubing, Mold, and Loft Data*: Geometric representation of a physical detailed part, assembly, surface, or system in either two or three dimensions created using CAD tools that consist of elemental (wireframe using lines and points like drafting), surfaces, and solids (swept, constructive solid geometry (CSG), and boundary representation (Brep)). Engineering models are used not only to produce 2-D drawings, but also serve as a basis for Numerical Control (NC) machining, obtaining engineering properties, finite element analysis, etc. These product data CAD and model requirements are in addition to the above drawing requirements.

The boundary representation (Brep) models are preferred instead of tessellated models, whenever there is a choice of one of these two deliveries to be made, since boundary representation contains a more accurate representation of models and surfaces. Brep and tessellated models are not to be considered as replacements for the native 3-D Models. Solid, wireframe, Brep, and other formats delivered as the native 3-D model format shall only be done when the original 3-D models were made in these formats. Model viewers that are designed to work with tessellated models would be the reason for an exception to the delivery requirement of having Brep instead of tessellated models, as identified by the EDMS at LGEC/WR-ALC.

Digital models used in the creation of the engineering drawings associated with the models in the same file, due to the characteristics of the CAD system being used, shall not have the model information visible when the drawing is viewed or printed. Similarly, any delivered model files shall not have the drawing data visible when the model is viewed or printed. Digital models that have not been previously delivered by the contractor to the latest version of the current CAD software used to develop the model data or digital models shall be updated by the contractor to the latest version of the current CAD software used to develop the model data for the duration of this contract.

Objects or other model data that are not pertinent to the drawing and especially those located outside the drawing borders need to be removed, hidden, or located to an area inside the borders and hidden where they will not interfere with the drawing data.

Model and mold files shall either contain annotation information sufficient to determine critical dimensions and surfaces, notes, materials, etc. or have this information delivered separately in files packaged with the model or mold files. Models and mold files shall be delivered separately from the drawing files according to the formats listed below. Non-part mold line surface data shall also be delivered according to the formats listed below. Filenames for models, tubing, and mold data do not have the same naming restrictions and maximum length for special characters that drawings do. Spreadsheet information for models, tubing, and mold data shall be annotated as appropriate under the File Type and Document Type columns as applicable.

Tubing data that are part of the data package shall also be delivered in the formats listed below separately from the drawing files.

The 3-D CAD Models, Tubing, and Mold data shall be produced and delivered in accordance with the formats and Geometry Creation Requirements and Delivery Formats below. Tube drawings that are contained in a digital data delivery shall be formatted per MIL-D-9898 (Tube Bend Drawings).

Delivery Formats: Native CAD - Any format native to the contractor's CAD system is acceptable, e.g. CATIA®, or AutoCAD® (preferred), or Intergraph®, or Cadkey®, or Applicon®, or ComputerVision®, or SDRC Ideas®

AND

Neutral - IGES, Version 5.0 or higher (For 2-D data, DXF is a suitable neutral file substitute for IGES) or PDES/STEP per ISO 10303, Application Protocols (APs) 201 through 206 and 210, or stereolithography (STL) files.

AND

Viewable - Viewable tessellated model files suitable for use with a 3rd party viewer, where the viewer will be defined later.

Loft Data - Loft data that are contained in a digital data delivery shall be delivered in native format in the latest version available in addition to the drawing requirements stated in paragraph 6b. The loft data shall be delivered preferably by surfaces. A map of the delivered loft surfaces shall also be provided in the applicable aircraft coordinate system to correlate with delivered drawings. The objective is to obtain access to loft digital data to simplify part production, repair, inspection, and to transfer data for spares procurement. There is a need to access, analyze, and manipulate loft surfaces for the purpose of extracting geometric surface data for the purpose of transfer to existing WR-ALC CAD/CAM systems for use in part design, manufacture, and inspection by WR-ALC personnel or by outside vendors. Mold line surface data shall be delivered in separate files for each surface in the formats below and a map(s) that uniquely identifies each discrete surface shall be provided for all configurations.

Delivery Format:

Native files – Any format native to the contractor's CAD system is acceptable, e.g. AutoCAD® (preferred), Unigraphics®, CATIA®, Intergraph®, Cadkey®, Applicon®, ComputerVision®, or SDRC Ideas®
AND

Neutral - American National Standards Institute (ANSI) Initial Graphics Exchange Specification (IGES) Version 5.0 or higher (For 2-D data, DXF is a suitable neutral file/substitute for IGES), stereolithography (STL) files, or STEP AP 203.

Geometry and CAD Creation Requirements for 2-D Drawings, 2-D and 3-D Tubing and Mold Data, and 2-D and 3-D Models

The following are requirements for the creation of 2-D drawings, 2-D or 3-D tubing and mold data, and 2-D and 3-D geometric models, to facilitate the IGES or STEP-based translation of 2-D and 3-D geometry with minimal loss and distortion of data:

(1) AutoCAD drawings that contain blocks or block definitions shall be saved using the WBLOCK command. The WBLOCK command shall not be used with Autocad Modeling Extension (AME) models.

(2) When creating 2-D and 3-D geometry, use only the standard colors specified whenever possible according to the colors that are basic to the originating CAD program. Do not use black as the color of any geometric entity. Black color could lead to visualization problems because the default background color used by other CAD systems tends to be black.

(a) Avoid assigning the color white to geometric elements unless this color is the default color of the CAD system being used. Many plotters tend to not plot geometric elements with white color.

(b) Do not use user-defined colors in the creation of models and drawings. They tend to cause problems during IGES or other translations.

(3) When creating 3-D geometry, use only the simple, fixed text fonts for the purpose of textual annotation. Note that this requirement is for annotations of 3-D geometry and not an engineering drawing or electronic schematic.

(4) User-defined line fonts or other add-in packages tend to cause problems during IGES-based or other data translations. They shall not be used. Do not use proprietary or copyrighted alphanumeric fonts.

(5) If the CAD system you are using allows you to choose the algebraic type of the spline curve/surface, it is preferred to have the Non Uniform Rational B-Spline Surface (NURBS) representation over the parametric spline curves.

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(6) If the originating CAD program's IGES processor can choose between trimmed surfaces (#144) and bounded surfaces (#143), it is preferred to have trimmed surfaces instead of bounded surfaces whenever IGES files are to be delivered. CAD programs that can process indirect surfaces also tend to support trimmed surfaces.

(7) The part geometry stored inside a CAD model should be self-contained. This means it shall not have references or pointers to entities outside of the database. If you have to use geometry from outside the database (a library of standard bolts, for example), physically transfer the geometry to the database. Do not use the reference approach. These requirements are not intended to recommend that the developer not use libraries internally, but instead recommend delivery of self-contained models.

(8) Disregard the above requirements dealing with lines and surfaces when solid modeling, or parametric (feature-based) modeling is used to create 3-D geometry. Use these requirements only as appropriate and applicable.

(9) Special fonts used in the creation of drawings that are not part of the basic CAD program and that are not proprietary or copyrighted shall be delivered with the digital data delivery. This is to enable the correct native CAD system viewing and a more complete translation of the original format and details of all delivered drawings. Whenever possible, use the CAD program's basic fonts in the creation of drawings. If special fonts are used for CAD drawings, the contractor must notify the EDMS at LGEC/WR-ALC at time of delivery.

(10) Drawings that are delivered shall have one drawing sheet per filename. This means that only one sheet number shall be placed on a drawing per filename. This also means that a CAD file shall not have multiple layers containing different sheets of the same document (or drawing) number. Word processing documents of engineering drawings delivered in raster graphics formats shall have each page saved as a unique filename.

(11) Digital drawings from CAD systems that create sub-directories as part of their normal file creation process shall be delivered as a single file using the UNIX 'tar' format in order to preserve the original directory structure. A zip utility version 2.5 or later may be used for PC-based systems so long as options are employed to ensure integrity of the directory structure.

(12) The drawing files shall be independent of external links to other software tools or databases. This requires that the file(s) shall be a stand-alone entity.

d. *Electrical/Electronic CAD and CAM Product Data Files:* This requirement includes product data files for electrical/electronic end products [e.g., Integrated Circuit (IC) devices, Programmable Logic Devices (PLDs), electrical wiring (cables, harnesses, etc), Printed Circuit Boards (PCBs), Printed Circuit Assemblies (PCAs), Line Replaceable Units (LRUs), etc]] and systems.

Product data shall include Computer-Aided Design (CAD) and Computer-Aided Manufacturing (CAM) files to provide design, simulation, testing, assembly, and manufacturing information. Data files shall be delivered for all applicable design levels [e.g. high-level behavioral and structure levels, Register-Transfer Level (RTL), and gate-level designs]. Product data files shall include (as applicable) source files (e.g., for schematics, truth tables, bubble diagrams, state diagrams, other design entry methodologies, and printed circuit assemblies), compiled files, object files, design models (such as those used in logical circuit designs, design simulations, and physical product designs), netlists (both flatten and hierarchical types for the logical circuit and physical product designs), component placement and connectivity (conductor routing), physical layouts, programming data, simulation and test files (stimulus-response data, test benches, timing data, test vectors, etc), 2-D/3-D mechanical interface files, machine control files (for drilling, photoplotting, parts assembly, etc), and other product data files.

The product data types or entities shall be independent of external links to other software tools or databases. The file(s) shall provide stand-alone design or logistic support disclosure information. Any restriction (that is not controlled by the applicable distribution statement code) to the usage or distribution of the product data files shall be detailed in an ASCII text file named "README - RESTRICTIONS.TXT." Identify the affected files, and explain the type of and reason for the additional restriction(s). This file shall be stored with the applicable encapsulated files and also stored at the root directory level of the media that the files are delivered.

NOTES: 1. See above paragraphs 6.a. and 6.b. for separate document and drawing requirements for the technical data package and the paragraph 6 note for the fileset encapsulation requirement. 2. Deliver both the ASCII and binary file formats of the native design data if the capability exists. 3. Neutral data files shall be optimized for reusability in other CAD or CAM systems in compliance with the neutral standard that the native CAD/CAM software is exporting.

Delivery Format: Native files - Native CAD e.g., Cadence®, Mentor Graphics®, ABEL®, CUPL®, VERIBEST®, Viewlogic®, Innoveda®, OrCAD®, Zuken Redac®, or others.

AND

Neutral - e.g., Electronic Design Interchange Format (EDIF), IPC-D-356, VHDL (VHSIC Hardware Description Language) (IEEE Std 1076), IGES per MIL-PRF-28000 (Class 6), GDS II® Stream, Berkeley's OPEN-PLA® (Programmable Logic Array), JEDEC Standard (EIA JESD3), Berkeley's SPICE®, STEP (STandard for the Exchange of Product model data) (ISO 10303 – AP203, AP210, AP212), GenCAD®, Verilog® HDL, Valor® ODB++®, GenCAM® (IPC 2510), Truth Tables (ASCII), IBIS® (I/O Buffer Information Specification, ANSI/EIA-656), WAVES® (Waveform and Vector Exchange Standard, IEEE Std 1029.1), Boolean Equations (ASCII), Gerber® (Standard RS-274 or Extended RS-274X), Excellon®, IDF (Intermediate Data File), etc.

7. Metadata Spreadsheet: A spreadsheet table structure that covers only the data to be delivered are required for each delivery, that is not based on the MIL-STD-1840 format or to a PDM AP 203 Interface and has the structure defined below. The Metadata Spreadsheet shall be delivered in Microsoft Excel digital format and may be delivered on the same media as the digital data. If the metadata spreadsheet cannot be delivered using Microsoft Excel, the following may be substituted upon approval from the EDMS at LGEC/WR-ALC, identified in block 6 of the DD Form 1423 which calls this requirement, either native format or ASCII. The spreadsheet information used in conjunction with the digital data is used to provide information and search content to retrieve data from the Digital Data Repository.

Content: The Metadata Spreadsheet shall contain a listing of all engineering documentation contained in the shipment.

Structure: Each row in the spreadsheet shall represent a distinct sheet number, unless covered by the exceptions below. All fields are left justified, except Sheet Number, Number of Sheets, Frame Number of a document number, Number of Frames, Revision Letter and Accompanying Document Revision (see definitions below). The data field titles shall be included at the top of the spreadsheet on row 1 only of the delivered spreadsheet. PIN and PIN revision fields shall be filled for all design model and engineering data files that do not include borders and drawing blocks. For spreadsheets delivered that exceed one thousand rows, the spreadsheet shall be divided into separate spreadsheet files on the delivered media. This division of spreadsheets should not cause the referenced documents listing or the indentured levels set listing that applies to a certain document number to be divided into separate spreadsheets.

Exception 1: For *word processing documents*, enter one row for each submission of the native document number delivered. The filename, document number, and all other applicable columns shall be filled.

Exception 2: For design model and engineering data files that do not include borders and drawing blocks, the sheet number is not applicable.

The fields in the spreadsheet table structure shall be entered in sequence as follows:

<u>DATA FIELD</u>	<u>FIXED FIELD LENGTH</u>
Filename (including extension & special characters)	30 characters

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Document Title	40 characters
Manufacturer (Design Activity Name)	32 characters
CAGE (Design Activity)	05 characters
Drawing Sheet Size	01 character
Sheet Number	04 characters
Number of sheets	04 characters
Distribution Code	01 character
Weapon System Model	15 characters
Revision	02 characters
Basic/Revision Date (DD-MMM-YYYY)	11 characters
SW_Name	20 characters
SW_Vendor Name	32 characters
SW_Version	10 characters
SW_Operating System	30 characters
SW_Operating System Version	10 characters
Data_Type	20 characters
File_Format (with applicable version)	32 characters
Data Rights	01 character
Document Type	03 characters
Document Number	32 characters
Frame Number	04 characters
Number of Frames	04 characters
Control Activity	02 characters
Accompanying Document Kind	02 characters
Accompanying Document Number	32 characters
Accompanying Document Revision	02 characters
Security Level	01 character
Media Number	02 characters

For Model and engineering data files that do not include drawing borders and drawing blocks, the Metadata Spreadsheet shall adhere to the following requirements. The document number and part or identifying number (PIN) shall be listed for use in indexing and traceability. These numbers shall reflect the closest document and P/N that is associated with or linked to the model or engineering data file.

Use all of the above spreadsheet data fields except for the following fields:

Drawing Sheet Size
Sheet Number
Number of Sheets
Frame Number
Number of Frames
Accompanying Document Kind
Accompanying Document Number
Accompanying Document Revision

-and add the following spreadsheet data fields:

<u>DATA FIELD</u>	<u>FIXED FIELD LENGTH</u>
Part/Assembly or Identifying Number (PIN)	32 characters
PIN Revision letter(s) or Version number(s)	02 characters
Quantity of Usage per Next Higher Assembly	03 characters
Effectivity	15 characters

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Definitions:

Filename - Specify a file naming convention that provides up to 30-character unique file names. File extensions of up to 3 characters are used to discriminate file types. If DOS files must be accommodated, use a file naming convention of up to only 8 characters. List all file types to be delivered.

Document Title - Enter the document title. This is text that is the complete descriptive name of a drawing or document.

Manufacturer (Design Activity) - Enter the name of the design activity whose CAGE is assigned to the drawing or document.

CAGE - Enter the CAGE Code currently assigned to the vendor/manufacturer identified in this record. The CAGE Code is required for all contractor, subcontractor, vendor, and supplier data. (This code was formerly known as the Federal Supply Code for Manufacturers (FSCM) and Code Identification).

Drawing Sheet Size - Enter the character that identifies the drawing size of the document identified in this record.

Sheet Number - The individual sheet number of a multiple page document or drawing. Enter the number of the sheet (right justified with leading zeros) associated with the document number identified in this record. If the total number of sheets exceeds 9999, or contains period(s) as part of the sheet number, contact the requiring office identified in block 6 of the DD Form 1423 for which calls out this requirement.

Number of Sheets - A number that identifies the total count of sheets or pages in a document. Enter the total number of sheets contained in the document identified in this record. If the total number of sheets exceeds 9999, contact the requiring office identified in block 6 of the DD Form 1423, which calls out this requirement.

Distribution Code - Enter the distribution statement code letter (A, B, C, D, E, F, or X) of the document identified in this record. This code letter in the spreadsheet corresponds with the same code letter used in the distribution statement paragraph that appears on the drawing (for each sheet number).

Weapon System Model Number - Enter if this file is unique to a weapon system model. For example, enter F15A, F15C/D, C130H, etc., if the file applies to one of these weapon systems. Leave blank if the file does not apply to a single designated weapon system.

Revision - The revision level assigned to a document or a specific sheet of a released document. Enter revision letter(s) applicable to the document number and specifically as applicable to each sheet number. This entry shall be alpha, right justified, with blank padding. For initial issue documents, the entry shall be blank.

Basic/Revision Date - The date when the document was approved for initial (original) release, or the date the revision of a document was approved. The latest date of the document (either the date of the basic approval or the date of the revision, whichever is later) shall be used. (EXAMPLE: 26-MAR-2001)

SW_Name - Enter the name of the native software CAD program used to generate the vector file.

SW_Vendor_Name - Enter the vendor of the native CAD software program.

SW_Version - Enter the version number and/or letters of the native software CAD program used to generate the file.

SW_Operating System - Enter the computer operating system for the CAD software.

SW_Operating System Version - Enter the version of the computer operating system for the CAD software.

Data Type - Enter the appropriate file type, e.g., vector, HPGL, ASCII text, raster, firmware, tubing, Gerber, etc.

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File Format - Enter the specific data type with version, e.g., HP 7586, Group 4, RS-274X, Autocad 2000, DXF r14, EDIF 400 Schematic, Intel Hex-32, etc.

Data Rights- Enter the code, which identifies the rights status of the information on the document or contained in the file identified by this record. All contractor, subcontractor, vendor, and supplier data shall have the rights status entered in this data field. The rights status codes are as follows:

- a. "U" signifies that the Government has unlimited rights to use the document or file so coded.
- b. "L" signifies that the Government has only limited rights to use the document or file so coded or has obtained Government Purpose License Rights (GPLR) to the data.
- c. "K" signifies that the Government has unlimited or limited rights to use the document or file for government purposes only, including competitive procurement

Document Type - A code that identifies the class or type of engineering document (e.g., product drawing, parts list, wire list, safety data sheet, etc.). Enter the prefix code in accordance with the following codes: (For engineering drawings with no specific document type, this field shall be not be populated.)

CODE	DEFINITION	DESCRIPTION
AL	Application List	Application data presented in a separate associated list (ASME Y14.34).
AW	Artwork	An accurately scaled configuration that is used to produce the artwork master, production master, or master pattern drawing (ASME Y14.24). Generally related to electronic items such as printed circuit boards and integrated circuit devices.
DL	Data List	A tabulation of all engineering drawings, associated lists, specifications, standards, and subordinate data lists pertaining to the item to which the data list applies and essential in-house documents necessary to meet the technical design disclosure requirements except for those in-house documents referenced parenthetically (ASME Y14.34).
D7	Undimensioned Drawing	An undimensioned drawing defines the shape and other design features of an object at a precise scale predominantly without dimensions. It provides an accurate pattern of the feature or features of an item (ASME Y14.24).
IL	Index List	A tabulation of data lists and subordinate index lists pertaining to the item to which the index list applies (ASME Y14.34).
MF	Model File(s)	A combination of design model, annotation and attributes that describes a product (ASME Y14.41).
MY	Mylar (Scanned Drawing)	Undimensioned drawings on stable-base material digitized by a precision scanning process (see Code D7).
NC	Numerical Control Data	Data file(s) for controlling equipment used in manufacturing parts.
NL	Notes List	A tabulation of all notes pertaining to a specific drawing.
PF	Programming Data File	Software installation file(s) used to program memory/logic devices or other programmable items/equipment.

PL	Parts List	A tabulation of all parts and bulk materials, except those materials that support a process and are not retained, such as cleaning solvents and masking materials, used in the item. (ASME Y14.34M)
TF	Test Data File(s)	Data file(s) for testing the system, subsystem, part, etc
WL	Wiring List	A list of tabular data and instructions necessary to establish wiring connections (ASME Y14.34).

Document Number - An alphanumeric identifier located within the drawing number block that is unique and is the primary reference for a document. Enter the document number (drawing, list, specification, etc.) identified in this record, followed by blanks. If the number is an associated document and is prefixed with alphas e.g. PL, DL, identifying the document as a specific type of associated document, the prefix shall stay intact as part of the document number and not stripped off. The same practice shall apply to any suffixes to the document identifying number by the originating organization. For models and engineering data files that do not include drawing borders and drawing blocks, the document number shall be listed for use in indexing and traceability. This number shall reflect the closest document that is associated with or linked to the model or data file.

Frame Number - Enter the number of the frame, right justified with leading zeros. Entry will be 0001 for all files.

Number of Frames - Enter the total number of frames required for this sheet (right justified with leading zeros).

Control Activity - Enter the applicable code, as follows:

<u>LOGISTICS ACTIVITY</u>	<u>CODE</u>
OC-ALC (Tinker AFB, OK)	MF
OO-ALC (Hill AFB, UT)	ME
SA-ALC (Kelly AFB, TX)	MB
SA-ALC (Special Weapons)	MA
SM-ALC (McClellan AFB, CA)	MC
WR-ALC (Robins AFB, GA)	MG

Accompanying Document Kind - When an accompanying document is delivered, enter the appropriate code from the following table. This is a required entry if a value is contained in the Accompanying Document Number column.

<u>Code</u>	<u>Document</u>
AD	Addendum
AM	Amendment
AN	Annex
AP	Appendix
AR	Article
AT	Attachment
EX	Exhibit
NT	Notice (safety, engineering, ECPs, ECOs, etc.)
SP	Specification (slash sheet or other similar types of associated specifications)
SU	Supplement
VR	Version
1N	Revision Notice

Accompanying Document Number - When an accompanying document identified is delivered, as shown in the Accompanying Document Kind table above, enter the accompanying document number, followed by blanks. This is a required entry if a value is contained in the Accompanying Document Kind column.

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Accompanying Document Revision - When an accompanying document identified is delivered, as shown in the Accompanying Document Kind table above, enter the accompanying document revision letter (alpha). Right justified, with blank padding.

Security Level - Enter the code that identifies the classification of the digital data according to the following:

<u>Code</u>	<u>Classification</u>
N	Unclassified
C	Confidential
S	Secret
T	Top Secret

Media Number - Enter the numbered figure that matches the label number for each consecutively numbered media type delivered.

Part or Identifying Number (PIN) - For models and engineering data files that do not include drawing borders and drawing blocks, an alphanumeric control number assigned to identify a specific item. The PIN is an identifier assigned by the responsible design activity or by the controlling nationally recognized standard, which uniquely identifies (relative to that design activity) a specific item. The PIN generally includes the controlling drawing or document number and optional suffix. The PIN identifier shall meet the same structure requirements as those for the drawing number. The PIN does not include the drawing revision identifier, drawing size, or CAGE Code. If the file is not directly part of or an integral part of a PIN, then this number shall reflect the closest part or item that is associated with or linked to the model or data file. PINs are assigned to product data files (such as those for printed circuit board artwork and programmable logic devices (PLD)), materials, parts, assemblies, equipment, accessories, and computer software.

PIN Revision Letter - The revision level assigned to a PIN. Enter revision letter(s) applicable to the PIN. The character(s) entry will be alpha, right justified, with blank padding. For initial issue PINs, the entry shall be blank.

Quantity of Usage per Next Higher Assembly - Enter the number of items necessary for the next higher assembly.

Effectivity - Description of the next higher assembly assigned to the component model part.

8. Indentured Data List (IDL): A spreadsheet table structure separate from the metadata spreadsheet that represents the indentured level and other listed fields below and is required for each digital data delivery. The indentured data list shall not represent indenture levels beyond the extent of the digital data delivery. This list shall identify all documents, except standardization documents required to define an item, assembly, or system. The IDL shall be delivered in Microsoft Excel format. If the IDL cannot be delivered using Microsoft Excel, native format or ASCII may be substituted upon obtaining approval from the requesting office identified in block 6 of the DD Form 1423 which calls out this requirement.

Content: The IDL shall contain a listing of all engineering documentation related to the contract end item as developed, produced, and/or modified for this contract. The IDL shall include all reference documents, which are not part of the delivery, at the appropriate levels. The IDL shall include indenture levels that apply to the delivered document numbers.

Structure: All fields are left justified, except Revision. The data field titles shall be included at the top of the spreadsheet on row one (1) only of the delivered spreadsheet.

The fields in the spreadsheet table structure shall be entered in sequence as follows:

<u>DATA FIELD</u>	<u>FIXED FIELD LENGTH</u>
Indenture Level	02 characters

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Part/Assembly Number	32 characters
Document Number	40 characters
Revision	02 characters
CAGE (Design Activity)	05 characters
Quantity of Usage per Next Higher Assembly	03 characters
Data Rights	01 character

Definitions:

Indenture Level - Enter the indenture level applicable. The indenture level shall indicate the relationship of a document/drawing to the next, and shall be indicated by a two-digit number. Begin with "00" for the system/top assembly drawing/document, increase by 1 ("01", "02", etc.) for each lower tier. Go down each "leg" of the tier until there is no lower drawing/document in that "leg". Go backwards up that same "leg", until finding a tier containing a second or subsequent unlisted drawing/document. Begin down this new "leg" until there is no lower drawing/document. Repeat this process until all drawings/documents have been listed. Example follows.

- 00 System/Top Assembly Drawing
- 01 Documentation and first subassembly drawing applicable to or referenced on 00 drawing
- 02 Documentation and first subassembly drawing applicable to or referenced on 01 drawing immediately above
- 03 Documentation and first subassembly drawing applicable to or referenced on 02 drawing immediately above
- 02 Next subassembly drawing applicable to or referenced on 01 drawing above
- 03 Documentation and first subassembly drawing applicable to or referenced on 02 drawing immediately above
- 03 Next subassembly drawing applicable to or referenced on last 02 drawing above
- 03 Next subassembly drawing applicable to or referenced on last 02 drawing above
- 04 Documentation and first subassembly drawing applicable to or referenced on 03 drawing immediately above
- 02 Next subassembly drawing applicable to or referenced on last 01 drawing above
- 03 Documentation and first subassembly drawing applicable to or referenced on 02 drawing immediately above
- 03 Next subassembly drawing applicable to or referenced on last 02 drawing above
- 01 Next subassembly drawing applicable to or referenced on 00 drawing above
- 02 Documentation and first subassembly drawing applicable to or referenced on 01 drawing immediately above
- 03 Documentation and first subassembly drawing applicable to or referenced on 02 drawing immediately above

Part/Assembly Number - An alphanumeric identifier that is unique and is the primary reference for a document. Enter the document number (drawing, list, specification, etc.) identified in this record, followed by blanks. Items listed in parentheses on documents are for reference only and shall not be recorded on the IDL. Drawing preparation documents and technical manuals shall not be included in the IDL.

Document Number - An alphanumeric identifier located within the drawing number block that is unique and is the primary reference for a document. Enter the document number (drawing, list, specification, etc.) identified in this record, followed by blanks. If the number is an associated document and is prefixed with alphas e.g. PL, DL, identifying the document as a specific type of associated document, the prefix shall stay intact as part of the document number and not stripped off. The same practice shall apply to any suffixes to the document identifying number by the originating organization. For models and engineering data files that do not include drawing borders and drawing blocks, the document number shall be listed for use in indexing and traceability. This number shall reflect the closest document that is associated with or linked to the model or data file.

Revision - The revision level assigned to a document or a specific sheet to a released document. Enter revision letter(s) applicable to the document number. A one-character entry will be alpha, right justified, with blank padding. For initial issue documents, the entry shall be blank.

CAGE - Enter the CAGE Code assigned to the vendor/manufacturer identified in this record. The CAGE Code is required for all contractor, subcontractor, vendor, and supplier data. (Formerly known as Federal Supply Code for Manufacturers (FSCM) and Code Identification.)

Quantity of Usage per Next Higher Assembly - Enter the number of items necessary for the next higher assembly.

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Data Rights- Enter the code, which identifies the rights status of the information on the document or contained in the file identified by this record. All contractor, subcontractor, vendor, and supplier data shall have the rights status entered in this data field. The rights status codes are as follows:

- a. "U" signifies that the Government has unlimited rights to use the document or file so coded.
- b. "L" signifies that the Government has only limited rights to use the document or file so coded or has obtained Government Purpose License Rights (GPLR) to the data.
- c. "K" signifies that the Government has either unlimited or limited rights to use the document or file for government purposes only, including competitive procurement.

9. Printed Board Artwork Master, Test, and Drill NC Data: Reference paragraph 6 note for the fileset encapsulation requirement and paragraph 6.d for general electrical/electronic CAD/CAM Product Data Requirements. View-only images (in HPGL, PDF, TIF Group 3 or 4, Windows Bitmap, JPEG, or other acceptable format) of the master artwork shall be provided as reference data in addition to the Gerber files. Printed Board Artwork Master per ASME Y14.24 and IPC-D-275 shall be in Gerber format (Standard RS-274 or Extended Gerber RS-274X). The RS-274X format, if used, shall be in compliance with the current or subsequent later revision of the 'Gerber RS-274X Format User's Guide' (Part # 414-100-014 Rev B or later) by Gerber Systems Corp and shall not contain data that would restrict its usage as a neutral file for laser photoplotters. The content, format, and configuration control requirements for the printed board fileset shall be as follows:

a. A printed board fileset document (that meets the requirements of document or drawing standards and practices, such as the latest version of ASME Y14.24 as of the contract date, which entails approved names, title, CAGE, document number, dates, revision data, etc.) shall be developed for each board fileset (see paragraph "g" below) to provide configuration control, content, and format information. The standard for engineering drawing practices format listed in CDRL DD Form 1423 Technical Data Package (TDP) shall apply. When a DD Form 1423 for TDP's does not exist, the EDMS at LGEC/WR-ALC shall be contacted for the drawing format practice that shall apply. ASME Y 14.1 is tailored as follows: Paragraph 6.2 Block L add: "Sheets shall be numbered beginning with one (1) and continue, using consecutive whole integers." This document shall be referenced on the master board drawing (ASME Y14.24). As an alternative to this document, the printed board fileset information may be provided as an integral part of the printed board master drawing, which shall include the fileset PIN number and PIN revision data.

b. A unique printed board fileset part or identifying number (PIN), preferably the dash number or prefix of the above printed board fileset document or printed board master drawing, shall be assigned for each printed board fileset and referenced with revision on the printed board fileset document or master drawing. One board fileset shall be submitted for each printed board.

NOTE: The PIN shall be in compliance with its definition and requirements stated in paragraph 7.

c. The printed board fileset document shall meet the format and content requirements of ASME Y14.24 and related contract drawing requirements and shall include the following information:

- (1) Board fileset PIN
- (2) Board fileset PIN Revision
- (3) Board Part Number
- (4) Master Drawing Document Number
- (5) The purpose of the Board fileset

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- (6) Used on data (System(s))
- (7) Name of each file in the Board fileset
- (8) Description of each file in the Board fileset (such as for silk screen, component layer, solder mask, etc.)
- (9) Artwork image revision letter of each image produced by the image file
- (10) Revision letter of each file, if any
- (11) Date and time each file was last changed
- (12) Size of each file in uncompressed form
- (13) Polarity of each image (positive or negative)
- (14) Instructions for composite layers, if any
- (15) Gerber file format information:
 - (a) Gerber type (RS-274 or Extended RS-274X)
 - (b) Data units of measurement (inches, millimeters, etc.)
 - (c) Dimension word type (coordinate/absolute or incremental)
 - (d) Number of integer and decimal digits
 - (e) Zero suppression (leading, trailing, or none)
 - (f) Zero offset dimensions
- (16) Native and/or neutral drill file format information:
 - (a) Drill file character set (such as EIA, ASCII, and EBCDIC)
 - (b) Native type with version (such as Excellon, Sieb & Meyer 3000, Trudrill, etc.)
 - (c) Neutral type with revision (such as Plain ASCII Text, ACL (ANSI/EIA 494), etc.)
 - (d) Data unit of measurement (inches, millimeters, etc.)
 - (e) Mode type (absolute or incremental)
 - (f) Unit scale factor
 - (g) Zero suppression type (leading, trailing, or none)
 - (h) Number of integer and decimal digits
 - (i) Drill rotation angle
 - (j) Drill x-y offset dimensions

(17) Identify the CAD system hardware platform, operating system with version, vendor of the printed circuit board (PCB) design software, and name of the PCB design software (with version) used to produce the Gerber and drill files.

(18) Identification of the target photoplotter model, manufacturer, type (laser, vector, etc.), and controller model, including any required special controller software configuration or processing packages, for the Gerber data, as applicable.

(19) Identification of the target NC drill machine and controller software with version for the native drill file.

(20) Special instruction, if any.

d. Delivery media containing board data files for more than one PCB shall contain a separate directory for each board or establish a file naming convention that would unambiguously distinguish the different board filesets.

e. Delivery media with compressed files shall also contain decompression software.

f. Delivery media shall be free of limited rights or shall be accompanied by documentation giving the Air Force unrestricted use of all files and software contained on the delivery media, as applicable.

g. Board fileset shall include the following files as a minimum:

(1) Aperture D-code table file(s) (see paragraph "h" below for details) (for Standard RS-274 files)

(2) Gerber Artwork image files (see paragraphs "i" and "j" for details)

(3) Native and/or neutral drill data files (see paragraph "k" for details)

h. Aperture D-code table file shall (for Standard RS-274 files):

(1) Record the date and time that the aperture file was last changed.

(2) Revision letter of aperture file

(3) Identify board part number

(4) State CAGE code

(5) Correlate aperture position numbers with D-code numbers

(6) Define D-code/aperture shapes using only standard shapes (which are standard circle, square, and rectangle). If custom shapes, such as thermals, octagons, etc are used, they shall be defined with dimensioned illustrations to capture their true shapes and sizes. Also, the custom D-code macro file shall be provided.

(7) Column headings shall identify horizontal (width) and vertical (height) dimensions which correspond to "X" and "Y" coordinates, respectively, for proper orientation of shapes.

(8) State units of measurement (mils, millimeters, etc.)

i. The Gerber files shall be properly aligned and include the following Artwork images:

(1) Circuit layers

(2) Board outline

- (3) Silk screen of component reference designations
- (4) Silk screen of component's outlines as they appear on the PCB
- (5) Solder masks (Top and Bottom of board)
- (6) Plated and unplated drill holes.
- (7) Others, as applicable

j. Each of the above Gerber Artwork image files (paragraph "i") shall include the following information as a minimum:

- (1) Date and time the Artwork image was last changed
- (2) Board part number
- (3) Revision letter of Artwork image
- (4) CAGE Code
- (5) Layer order number and/or image name
- (6) Vertical and horizontal register marks with x-y coordinate dimensions and tolerances

k. The drill data fileset shall contain the following information:

- (1) Date and time the drill file(s) were last changed
- (2) Board part number
- (3) File revision
- (4) CAGE Code
- (5) File type (Excellon, Plain ASCII Text, etc.)
- (6) Drill tool sizes
- (7) Holes x-y coordinates
- (8) Drill tool (bit) used at each x-y location
- (9) Identify plated and unplated holes, if not identified on the master drawing

l. Test data files for PCBs shall be delivered as IPC-D-356 or other acceptable format.

10. Software and Memory Device Data: See the Electronic Design Data section (Paragraph 6d) for the delivery of programmable devices (such as PALs, PROMs, etc.) design and programming files. NOTE: Reference paragraph 6 note for the fileset encapsulation requirement.

11. Classified Data:

a. For quantities and distribution, refer to DD Form 1423, Block 14 of the contract.

b. Classified digital data shall be delivered either on Compact Disk (IAW ISO 9660 or Joliet format) or 3.5" Floppy (MSDOS-based). The contractor, based on file sizes and overall number of files delivered, will make this choice of media. A separate spreadsheet containing the contents of the classified digital data delivery shall also be delivered and shall have the words "CLASSIFIED DATA" as the contents of the file.

c. In the event that aperture cards must be delivered, such as in the case of legacy data or for other reasons, the aperture cards shall be a separate delivery and shall have the appropriate MIL-STD-1840 header information.

NOTE: When a set of data requires both classified and unclassified data deliveries, the shipment of classified data shall contain a reference in the package to identify the unclassified data shipment, and the unclassified shipment shall contain a reference in that package to identify the classified data shipment. Classified and unclassified data shall NOT be intermingled in a shipment, but instead they shall be packaged and shipped separately. Contract requirements for protection of classified data shall apply.

d. Physical media shall be labeled with the following information:

(1) CLASSIFIED DATA

(2) The Contractor name/CAGE

(3) The Contract number

(4) System

(5) The appropriate disk number of the total (e.g., "Disk 2 of 3")

(6) Range of document numbers included on the tape/disk.

(7) List the operating system command (e.g., UNIX® tar) used to archive the data. If space precludes placing this information on the label, provide the information on a separate sheet of paper packaged with the disk or tape.

(8) The appropriate Distribution Statement Code and Export Control Notice shall be included in accordance with DD Form 1423, which calls out this requirement.

INSTRUCTIONS FOR COMPLETING DD FORM 1423

(See DoD 5010.12-M for detailed instructions.)

FOR GOVERNMENT PERSONNEL

Item A. Self-explanatory.

Item B. Self-explanatory.

Item C. Mark (X) appropriate category: TDP - Technical Data Package; TM - Technical Manual; Other - other category of data, such as "Provisioning," "Configuration Management," etc.

Item D. Enter name of system/item being acquired that data will support.

Item E. Self-explanatory (to be filled in after contract award).

Item F. Self-explanatory (to be filled in after contract award).

Item G. Signature of preparer of CDRL.

Item H. Date CDRL was prepared.

Item I. Signature of CDRL approval authority.

Item J. Date CDRL was approved.

Item 1. See DoD FAR Supplement Subpart 4.71 for proper numbering.

Item 2. Enter title as it appears on data acquisition document cited in Item 4.

Item 3. Enter subtitle of data item for further definition of data item (optional entry).

Item 4. Enter Data Item Description (DID) number, military specification number, or military standard number listed in DoD 5010.12-L (AMSDL), or one-time DID number, that defines data content and format requirements.

Item 5. Enter reference to tasking in contract that generates requirement for the data item (e.g., Statement of Work paragraph number).

Item 6. Enter technical office responsible for ensuring adequacy of the data item.

Item 7. Specify requirement for inspection/acceptance of the data item by the Government.

Item 8. Specify requirement for approval of a draft before preparation of the final data item.

Item 9. For technical data, specify requirement for contractor to mark the appropriate distribution statement on the data (ref. DoDD 5230.24).

Item 10. Specify number of times data items are to be delivered.

Item 11. Specify as-of date of data item, when applicable.

Item 12. Specify when first submittal is required.

Item 13. Specify when subsequent submittals are required, when applicable.

Item 14. Enter addressees and number of draft/final copies to be delivered to each addressee. Explain reproducible copies in Item 16.

Item 15. Enter total number of draft/final copies to be delivered.

Item 16. Use for additional/clarifying information for Items 1 through 15. Examples are: Tailoring of documents cited in Item 4; Clarification of submittal dates in Items 12 and 13; Explanation of reproducible copies in Item 14.; Desired medium for delivery of the data item.

FOR THE CONTRACTOR

Item 17. Specify appropriate price group from one of the following groups of effort in developing estimated prices for each data item listed on the DD Form 1423.

a. Group I. Definition - Data which is not otherwise essential to the contractor's performance of the primary contracted effort (production, development, testing, and administration) but which is required by DD Form 1423.

Estimated Price - Costs to be included under Group I are those applicable to preparing and assembling the data item in conformance with Government requirements, and the administration and other expenses related to reproducing and delivering such data items to the Government.

b. Group II. Definition - Data which is essential to the performance of the primary contracted effort but the contractor is required to perform additional work to conform to Government requirements with regard to depth of content, format, frequency of submittal, preparation, control, or quality of the data item.

Estimated Price - Costs to be included under Group II are those incurred over and above the cost of the essential data item without conforming to Government requirements, and the administrative and other expenses related to reproducing and delivering such data item to the Government.

c. Group III. Definition - Data which the contractor must develop for his internal use in performance of the primary contracted effort and does not require any substantial change to conform to Government requirements with regard to depth of content, format, frequency of submittal, preparation, control, and quality of the data item.

Estimated Price - Costs to be included under Group III are the administrative and other expenses related to reproducing and delivering such data item to the Government.

d. Group IV. Definition - Data which is developed by the contractor as part of his normal operating procedures and his effort in supplying these data to the Government is minimal.

Estimated Price - Group IV items should normally be shown on the DD Form 1423 at no cost.

Item 18. For each data item, enter an amount equal to that portion of the total price which is estimated to be attributable to the production or development for the Government of that item of data. These estimated data prices shall be developed only from those costs which will be incurred as a direct result of the requirement to supply the data, over and above those costs which would otherwise be incurred in performance of the contract if no data were required. The estimated data prices shall not include any amount for rights in data. The Government's right to use the data shall be governed by the pertinent provisions of the contract.